Watershed: **Calaveras River – San Antonio Creek**

Years Sampled: **2007-2008**

Study Objectives:

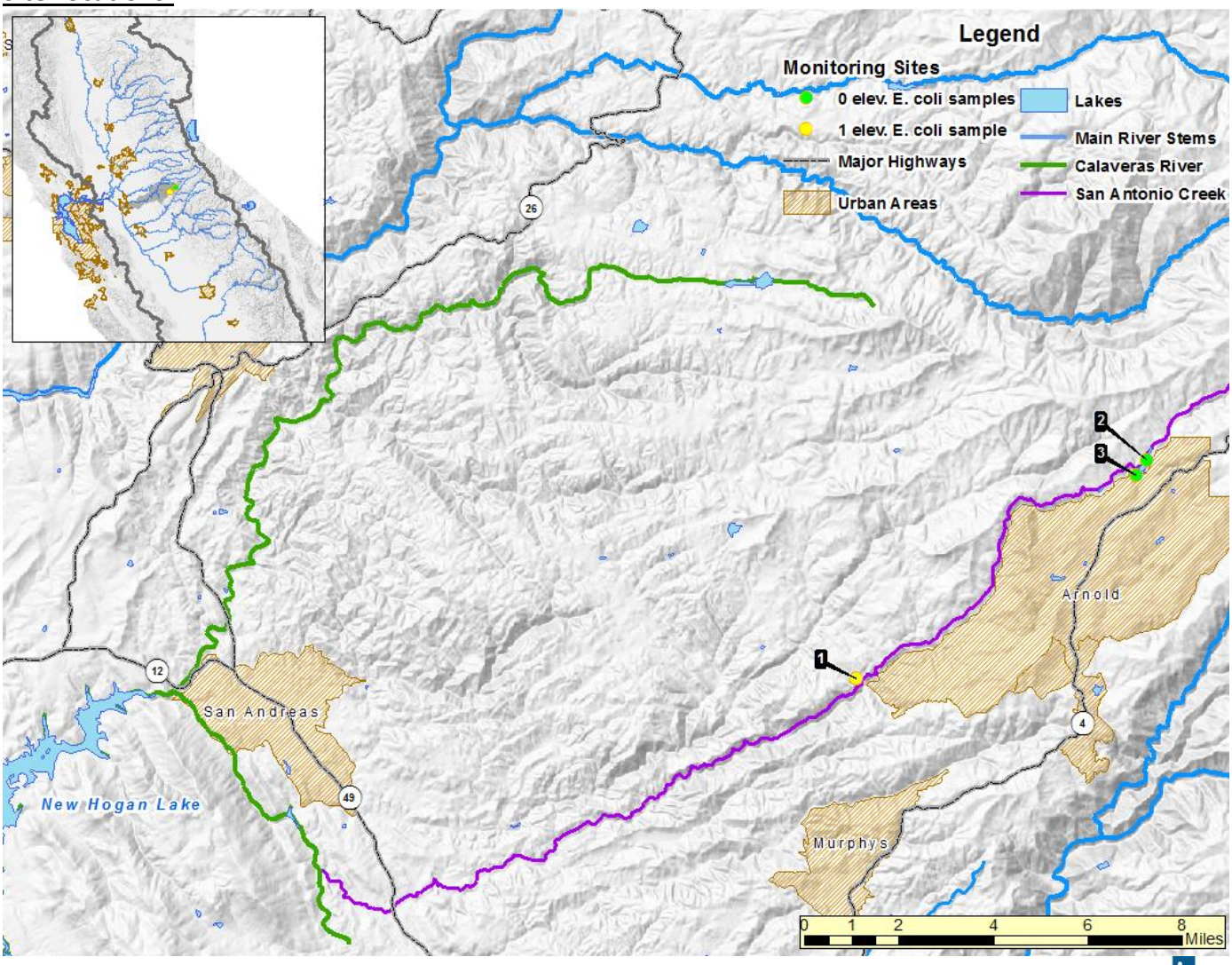
1. Is there any evidence that beneficial uses are being impacted, and if so, what are potential contributors?
2. Are there any noticeable regional, seasonal or trends observed in the water quality data?
3. What are pathogen concentrations at selected monitoring sites?

KEY STATISTICS

Number of sites sampled	**3**
Sampled by	**Water Board Staff (Sac)**
Number of sites sampled for pathogens	**0**
Number of total samples	**9**
Sampling Frequency	**2x/mo. (Aug-Sept.)**
Assessment Threshold	**320 MPN/100 mL**

Message: **One of nine samples has demonstrated elevated *E.coli.* Two sites never exceeded the assessment threshold**

Site Locations:



Summary of Results:

Table 1: Field Measurements

Station Code	Map #	Station Name	Oxygen, Dissolved (mg/L)		pH		SpConductivity (uS/cm)		Temperature (˚C)		Turbidity (NTU)	
			Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
533CAL001	1	San Antonio Creek at Sheep Ranch Road	7.73	8.51	7.53	7.70	74.9	75.6	15.60	22.30	NR	NR
533CAL900	2	Upper San Antonio Creek at in-flow of White Pines Lake	NR	NR	6.60	6.80	30.0	62.0	12.00	14.70	NR	NR
533CAL901	3	Upper San Antonio Creek at out-flow of White Pines Lake	NR	NR	6.87	7.00	53.0	57.7	22.30	24.20	NR	NR

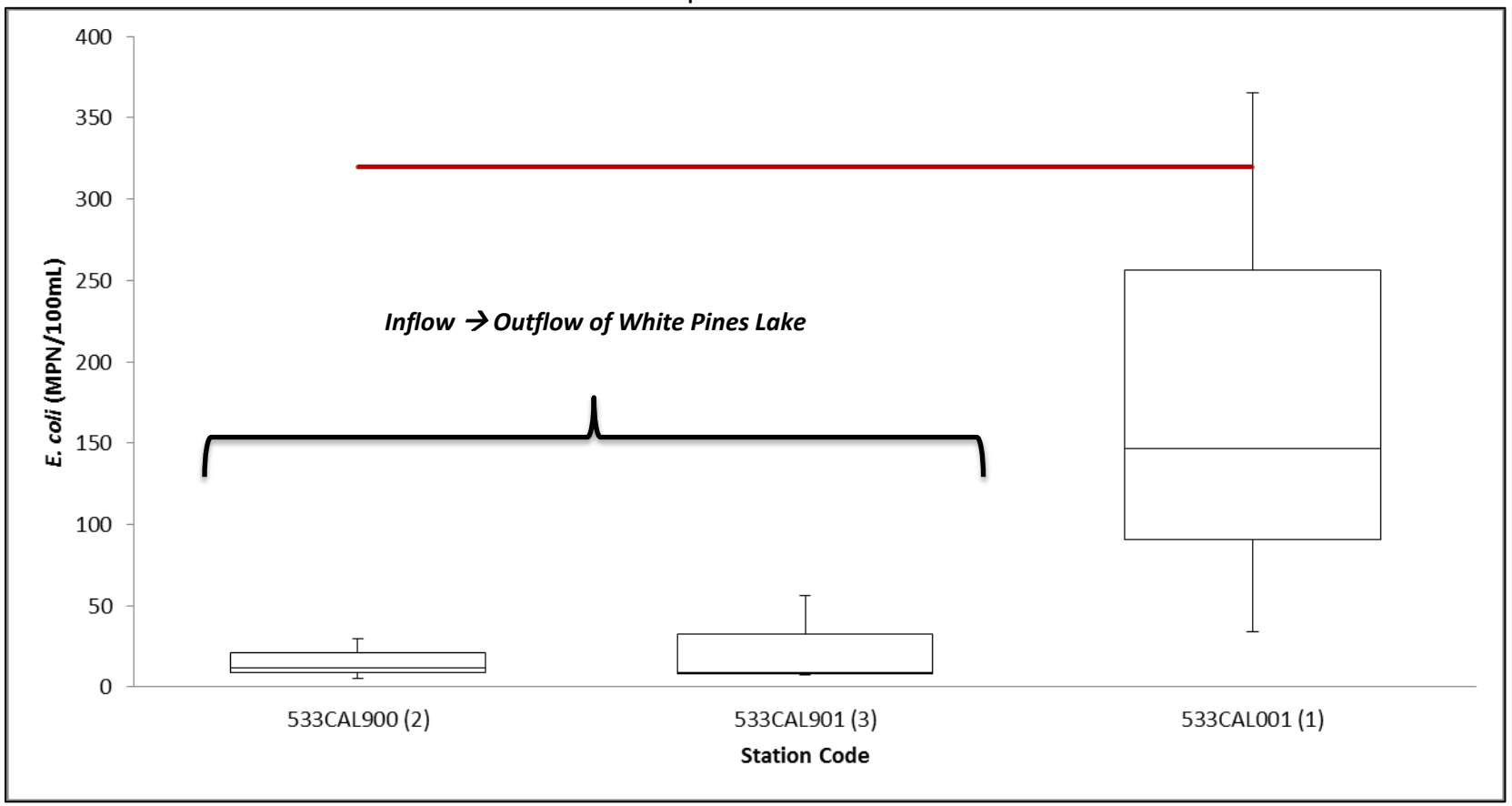
NR: Not Recorded

Table 2: *E. coli* and Pathogen Results

Map #	*E. coli* (MPN/100ml)					*Cryptosporidium* (cysts/L)			*Giardia* (oocysts/L)			*Salmonella* (MPN/100mL)			*E.Coli* O157:H7 (Presence/Absence)		
	Mean	Min	Max	Count	>320	Max Result	Count	(+)	Max Result	Count	(+)	Max Result	Count	(+)	Result	Count	(+)
1	182.1	34.1	365.4	3	1	NA	0	0	NA	0	0	NA	0	0	NA	0	0
2	15.7	5.2	30.0	3	0	NA	0	0	NA	0	0	NA	0	0	NA	0	0
3	24.2	7.5	56.5	3	0	NA	0	0	NA	0	0	NA	0	0	NA	0	0

E.coli - Highlighted Cells: Exceeds EPA Guidline of 320 MPN/100ml Pathogens- (+): positive result, Highlighted Cells: positive results, NA: Not Applicable

Graph 1: *E.coli* Results



2,3,1 = progressive DS flow along San Antonio Creek

WHAT IS THE MEASURE SHOWING?

The San Antonio Creek is located in the Calaveras watershed. The creek runs through White Pines Lake in the town of Arnold, California. San Antonio Creek begins just east of Calaveras Big Trees State Park and merges with the South Fork of the Calaveras River, which then flows into New Hogan Lake. Field measurements for each site are shown in Table 1.

Results show that only 1 of 9 samples exhibited elevated levels of *E.coli*; it was located in San Antonio Creek at Sheep Ranch Road (1) with a maximum value of 365.4 MPN/100 mL (shown in Table 2). The percentage of contamination at the above sample locations is 11.1%; at the site specifically, this percentage is 33%. However, the sample size for this site is unrepresentatively small at 3 grab samples. There were no detections along the inflow (2) or outflow (3) of White Pines Lake (shown in Graph 1).

The watershed is primarily herbaceous (Jin et al., 2013), yet potential non-point urban sources are abundant. It is heavily utilized for recreational activities, and is home to numerous waterfowl throughout the year as well. In addition, the increasing drought may be a contributing factor for contamination as the waters become more concentrated.

No sites in the San Antonio watershed were sampled for pathogens.

WHY THIS INFORMATION IS IMPORTANT?

In 2012, the USEPA amended recreational water quality guidelines for human health under the Clean Water Act, specifying the standard threshold value (STV) for the indicator bacteria *E. coli* as 320 colony-forming units (CFU) per 100 milliliters (mL). The STV represents the 90% percentile of the water quality distribution, beyond which the water body is not recommended for recreation (Nappier & Tracy, 2012).

E. coli is an indicator of potential fecal contamination and risk of illness for those exposed to water (e.g. when swimming). Since *E. coli* is only an indicator of potential pathogens and does not necessarily identify an immediate health concern, the data collected from this study provide more information on pathogen indicators as well as specific water-borne pathogen concentrations to better assess their impact on the beneficial use of recreation and to identify potential contributors by sub watershed.

WHAT FACTORS INFLUENCE THE MEASURE?

E. coli and specific water-borne pathogens can come from human or animal waste and may be highly mobile and variable in flowing streams. In addition to human recreational use, the presence of pathogens in water may be the result of cattle grazing, wildlife, urban and agricultural runoff, or sewage spills. The physical condition of the watershed may also influence pathogen measurements, however in this study field measurements (temperature, SC, DO, turbidity and pH) were variable between sites and it is unclear if these constituents had an effect on the *E. coli* or pathogen measurements.

TECHNICAL CONSIDERATIONS:

- Data available at: CEDEN
- *E. coli* is only an indicator of potential pathogens and does not necessarily identify an immediate health concern.
- Public reports and fact sheets are available at: http://www.waterboards.ca.gov/centralvalley/water_issues/water_quality_studies/surface_water_ambient_monitoring/swamp_regionwide_activities/index.shtml

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San Antonio Creek [Map]. 1:150000. RB5S GIS Data [computer files]. Rancho Cordova, CA. c2014 – [cited January 2015]. Using: ArcGIS [GIS software]. Version 10.2. Redlands, CA: ESRI Inc., 2013.

Jin, S., Yang, L., Danielson, P., Homer, C., Fry, J., and Xian, G. A Comprehensive change detection method for updating the National Land Cover Database to circa 2011. Multi-Resolution Land Characteristics Consortium [Internet]. c2013 – [cited January 2015]. Available from: http://www.mrlc.gov/nlcd2011.php

Nappier, Sharon, Tracy Bone. 2012 Recreational Water Quality Criteria. Environmental Protection Agency [Internet]. Sacramento, CA. c2012 – [cited January 2015]. Available from: http://water.epa.gov/scitech/swguidance/standards/criteria/health/recreation/upload/factsheet2012.pdf